

Amendments to the Claims:

Please replace all prior versions, and listings of claims in the application with the following listing of claims.

Listing of claims

Claim 1-18 (canceled)

Claim 19 (currently amended): A polling based method of scheduling upstream data for frame based communication between a plurality of terminals and a master controller, the method comprising:

dividing a communication from each one of said terminals to the master controller into upstream frames;

providing a plurality of concentration elements for local scheduling of upstream data and partitioning the plurality of concentration elements and the plurality of terminals over a plurality of cells;

distributing said plurality of cells on a multiple hierarchical level star topology, each cell belonging to a hierarchical level N , where N is comprised between a top level, corresponding to a single cell to which the master controller is assigned, and a bottom level;

in each cell at level N , selecting one concentration element to be the master element for the cell and selecting the remaining concentration elements and terminals in said cell to be slave elements of the master element for the cell;

each master element in a cell at level N being in turn a slave of the master element in one of the cells at level $N+1$, the master element at the top level being the master controller;

defining flow service categories;

at each master element at level N , collecting uplink aggregate requests and flows originating from the slave elements thereof and, for each service category, aggregating flows into one aggregated flow generating new uplink requests for each flow, which are input to the master element at level $N+1$ to which the master element at level N is slave;

at each master element, allocating bandwidth to each connected slave according to said new uplink aggregate requests and to the available bandwidth; [[and]]

at each slave element at level N , aggregating flows according to said flows categories and, at each polling period, sending aggregate bandwidth requests to the corresponding master element at level N , said requests comprising, for each category, aggregate queue status of the active connections and aggregate guaranteed rate equal to the sum of the guaranteed rates of the connections that have at least one cell in the corresponding queue in the slave element; and

at each master element and at each polling time period, integrating the aggregate guaranteed rate over a time window of length IT , where IT is an integer multiple of the polling time period, so as to dynamically adjust the guaranteed quote for each slave element.

Claim 20 (previously presented): The method of claim 19, further comprising, at each master element, recalculating requests for each aggregate flow at each polling period or multiple thereof.

Claim 21 (previously presented): The method of claim 19, further comprising reserving a first portion of the upstream frame for the storing of bandwidth request information, the size of said first portion of the frame being sufficient to address all the slots in the frame.

Claim 22 (currently amended): The method of claim 19, further comprising:

reserving a first portion of the upstream frame for the storing of bandwidth request information, the size of the first portion of the upstream frame being sufficient to address $RTT + (N_{RG} - 1)$ slots in the upstream frame, wherein RTT is the Round Trip Time and N_{RG} is the number of different request groups in a terminal; and

piggybacking the remaining request information on traffic slots in the upstream frame.

Claim 23 (previously presented): The method of claim 19, wherein the bandwidth request information comprises guaranteed bandwidth requirements and excess bandwidth requirements.

Claim 24 (currently amended)

Claim 25 (currently amended): A polling based distributed scheduler for frame based communication between a plurality of terminals and a master controller, comprising:

a plurality of concentration elements for local scheduling of upstream data; and upstream frames into which a communication between each one of said terminals and said master controller is divided,

wherein:

the plurality of concentration elements and the plurality of terminals are partitioned over a plurality of cells distributed on a multiple hierarchical level star topology, each cell belonging to a hierarchical level N , where N is comprised between a top level, corresponding to a single cell to which the master controller is assigned, and a bottom level;

at each cell at level N , one concentration element is the master element for the cell and the remaining concentration elements and terminals in said cell are slave elements of the master element for the cell;

each master element in a cell at level N is in turn a slave of the master element in one of the cells at level $N + 1$, the master element at the top level being the master controller;

each master element at level N comprises:

means for collecting uplink aggregate requests and flows originating from the slave elements thereof;

means for generating, according to flow service categories, an aggregate flow and aggregate uplink requests, which are input to the master element at level $N+1$ to which the master element at level N is slave; and

means for allocating bandwidth to each connected slave according to said aggregate requests and to the available bandwidth; [[and]]

each slave element at level N comprises aggregating flows means which aggregate flows according to said flows categories and, at each polling period, send aggregate bandwidth requests to the corresponding master element at level N , said requests comprising, for each category, aggregate queue status of the active connections and aggregate guaranteed rate equal to the sum of the guaranteed rates of the connections that have at least one cell in the corresponding queue in the slave element; and

each master element comprises means for integrating at each polling time period the aggregate guaranteed rate over a time window of length IT , where IT is an integer multiple of the polling time period, so as to dynamically adjust the guaranteed quote for each slave element.

Claim 26 (previously presented): The scheduler of claim 25, comprising polling means that, at each master element, are set so as to recalculate aggregate requests at each polling period or multiple thereof.

Claim 27 (previously presented): The scheduler of claim 25, wherein a first portion of the upstream frame stores bandwidth request information, the size of said first portion of the frame being sufficient to address all the slots in the frame.

Claim 28 (currently amended): The scheduler of claim 25, wherein:

a first portion of the upstream frame is reserved for the storing of bandwidth request information, the size of the first portion of the upstream frame being sufficient to address $RTT + (N_{RG} - 1)$ slots in the upstream frame, wherein RTT is the Round Trip Time and N_{RG} is the number of different request groups in a terminal; and

the remaining request information on traffic slots is piggybacked in the upstream frame.

Claim 29 (previously presented): The scheduler of claim 25, wherein the bandwidth request information comprises guaranteed bandwidth requirements and excess bandwidth requirements.

Claim 30 (canceled)